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The Factor Structure of the PAS-ADD Checklist with Adults with Intellectual Disabilities

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Abstract

Background. The PAS-ADD Checklist is designed to screen for likely mental health problems in people with intellectual disabilities (ID). The specificity of recommended subscales derived from diagnostic criteria is unclear; this paper investigates empirically derived subscales.

Methods. Informants who had known service users for a median 24 months completed the PAS-ADD Checklist on 1155 adults with ID living in community, residential care and hospital settings in a county in North East England.

Results. The sample was randomly divided into two, with all item scores dichotomized. An exploratory principal components factor analysis with varimax rotation was conducted on Subsample A, producing an optimal seven-factor solution. However, a confirmatory factor analysis using this factor structure for Subsample B revealed moderate to poor fit. Further exploratory and confirmatory factor analyses indicated that empirically derived PAS-ADD subscales were inconsistent.

Conclusions. Given the inconsistency of empirically derived subscales, we do not recommend using the PAS-ADD Checklist to identify specific types of psychopathology; it may have more utility as a screening tool for general psychopathology and referral for more detailed assessment.

Keywords: Factor Analysis; Intellectual Disabilities; PAS-ADD Checklist; Psychiatric Disorders

Introduction

Increasing clinical and research attention is being paid to the mental health problems experienced by people with intellectual disabilities (ID) (Hatton & Taylor, 2005). One major clinical issue is that mental health problems may be more prevalent amongst people with ID but are more likely to be undetected and therefore untreated (Patel et al, 1993; Reiss, 1990; Reiss et al., 1982). As cases that are not identified cannot be assessed and treated effectively, then "case recognition" is a crucial step in meeting the mental health needs of people with ID (Moss, 1999, p.18).

To assist with the detection of mental health problems in people with ID, several researchers have developed relatively short and easy to use screening tools, designed to be completed by informants about a person with ID. Most of these screening tools have been developed specifically for use with people with ID, including the Reiss Screen for Maladaptive Behavior (Reiss, 1988a, b), the Diagnostic Assessment for the Severely Handicapped (Matson et al., 1991), the Psychopathology Instrument for Mentally Retarded Adults (Matson et al., 1984; Senatore et al., 1985) and the Psychopathology Assessment Schedule – Adults with Developmental Disabilities (PAS-ADD) Checklist (Moss et al., 1996, 1998).

One of the most commonly used screening tools is the PAS-ADD Checklist (Moss et al., 1996, 1998; Roy et al., 1997; Sturmey et al., 2005; Taylor et al., 2004). This was developed as a rapid and easy to use screening instrument to help carers identify likely mental health problems in people with ID and to make informed referral decisions. The 29 symptom items in the measure were derived from items in a full

clinical diagnostic interview (the PAS-ADD; Costello et al., 1997; Moss et al., 1997) that has been shown to have a high degree of predictive validity of psychiatric diagnoses, and has additional items designed to ensure broad coverage across a wide range of Axis I domains. In the original version of the PAS-ADD Checklist all items are scored on four-point scales indicating the presence and severity of each symptom in the past four weeks (Moss et al., 1996, 1998). Moss et al. (1998) recommend calculating a total score

and three subscale scores: affective/neurotic disorder (20 items); possible organic disorder (6 items); and psychotic disorder (4 items), with threshold scores for each subscale indicating a possible mental health problem. These subscales were derived from an examination of ICD-10 symptom clusters rather than empirically using factor analysis (Moss et al., 1998). Studies using these subscales have reported adequate psychometric properties (internal reliability, inter-rater reliability) and good sensitivity in detecting mental health problems generally (Moss et al., 1998; Simpson, 1998; Sturmey et al., 2005), although the differential detection potential of the individual subscales has been questioned (Simpson, 1998; Sturmey et al., 2005; Taylor et al., 2004).

An alternative to deriving PAS-ADD Checklist subscales using clinical diagnostic criteria is to derive subscales empirically, using factor analysis. Two previous studies have conducted factor analyses on the PAS-ADD Checklist. Moss et al. (1998) conducted a factor analysis with a sample of 201 adults with ID in community settings, and reported eight factors, labelled: Depression 1 (6 items); Restlessness (4 items); Phobic anxiety (5 items); Psychosis (3 items); Hypomania (3 items); Autistic spectrum (3 items); Depression 2 (2 items); Non-specific (2 items). More recently, Sturmey et al. (2005) reported a factor analysis of the PAS-ADD Checklist with 226 adults with intellectual disabilities, reporting a one-factor solution relating to mood. Although Moss et al. (2000) and Holden and Gitlesen (2003) report results on four PAS-ADD Checklist subscales rather than three (depression, anxiety, hypomania, psychosis) the method used to derive these subscales is unclear, and the two studies conflict in their reports of associations between these Checklist subscales and measures of challenging behaviour.

This paper reports on a series of factor analyses conducted on the PAS-ADD Checklist using a large sample of adults with ID in the UK living across a broad range of settings (see Taylor et al., 2004), with the aim of determining whether clinically relevant, psychometrically adequate and stable subscales can be empirically derived.

Method

Participants and Procedure

Ethical approval for the project was obtained from the relevant NHS Local Research Ethics Committee. A total of 1,181 adults with ID were identified as resident either in hospital or known to the care management system within a county district in North East England (total population approximately 310,000). The area is mixed rural-urban in character. The managers of wards for hospital residents, and the care managers for those living in the community, were asked to act as informants and complete mental health screening assessments on service users themselves, or to approach an appropriate carer or supporter who knew the service user well (i.e. a person in at least weekly contact with the service user; typically support staff, keyworkers or family members). Potential informants were asked to read an information sheet (with contact details for a member of the research team if further discussion was required), and sign and return a consent form with the PAS-ADD Checklist if they chose to take part in the study. Informants were residential home support staff (n = 357), care managers (n = 260), community nurses (n = 137), social workers (n = 83), family members (n = 79), and qualified nursing staff (n = 199) for those living in hospital. Informants had known service users for a median 24 months (range 1-444 months). A previous analysis of this sample (Taylor et al., 2004) reported no associations between the length of time informants had known the service users and either PAD-ADD Checklist total or subscale scores.

A total of 26 assessments were not completed (seven informant refusals, 12 non-returns, seven service user deaths before assessments). Assessments were completed and returned on a total of 1,155 people, 98% of the identified population of adults with ID in the study district. Five hundred and twenty seven service users lived in the community in their own homes independently, or with support from their families or paid support staff, 400 service users lived in staff-supported residential care settings in the community, and 228 resided in a specialist ID hospital facility. A previous analysis of this sample (Taylor et al., 2004) reported higher scores on the PAS-ADD Checklist Psychosis subscale for hospital residents

compared to residential care and community service users, but no differences in scores on the Affective/Neurotic or Organic subscales. Ages were not obtained for 33 service users. The mean age for the remainder (n = 1,122) was 43.97 years (SD = 15.19; range 17-92 years). Service users were 664 males (mean age = 42.64 years, SD = 13.96) and 491 females (mean age = 45.74 years, SD = 16.55).

Materials

A brief demographic characteristics checklist was used, collecting information on age, gender and living situation. The PAS-ADD Checklist (Moss et al., 1996) comprises 29 items rated on a four-point scale concerning psychiatric symptoms observed during the past four weeks. Items are worded using everyday language so the Checklist can be completed by non-professionals who know the person with ID but have no training in psychopathology.

Results

As recommended in texts concerning the evaluation of health measurement scales (e.g. Streiner and Norman, 1995) the following analytic strategy was used to investigate the factor structure of the PAS-ADD Checklist. First, the sample of 1,155 service users was randomly divided into two subsamples. An exploratory factor analysis was conducted on Subsample A to construct a set of empirically derived subscales within this sample. Second, the goodness of fit of the set of subscales derived from Subsample A was then tested on the Subsample B data, using confirmatory factor analysis. This allows us to determine the stability of the empirically derived subscales within two halves of the same sample, rather than simply determining whether exploratory factor analysis can be used to derive a set of subscales as previous research has done.

As outlined above, the first step was to conduct an exploratory factor analysis on Subsample A (n=543 with complete PAS-ADD Checklist data). Because all item scores were highly skewed in their original form, the authors followed the recommendation of Simpson (1998) concerning the scoring of the PAS-ADD Checklist and dichotomised item scores into symptom absent vs symptom present. Simpson

(1998) reported increased reliability and correspondence with full PAS-ADD diagnoses using dichotomized PAS-ADD Checklist item scores. Dichotomized scores for skewed variables are also recommended for the purpose of factor analysis (Hair et al., 1998). Two items were excluded from the factor analysis due to all service users scoring zero or only one service user scoring above zero (Item 11: Change in weight, enough to make clothing fit less well; Item 29: Any other behavioural problem which is a change from the person's usual).

To allow for the possibility of subscales being associated with each other, principal components factor analyses with oblique rotation (direct oblimin, delta=0) were conducted. However, 7-factor, 6-factor, 5-factor and 4-factor rotation solutions all showed similar problems of interpretation; a high number of iterations (27-30) were required to produce rotated solutions and in all solutions at least two factors contained all items with negative factor loadings. Because in all oblique rotation solutions there were very few items which loaded >=0.4 (whether positively or negatively loaded) on more than one factor (0-3 items), exploratory factor analyses were re-run using varimax rotation.

The following criteria were used when deciding on the optimal number of factors for the rotated factor solution: a) all factors should have eigenvalues>1; b) all rotated factors should account for >5% of the variance in item scores; c) sufficient factors to account for >60% of the variance in item scores should be included (Bieling et al., 1998; Hair et al., 1998). The 7-factor rotated solution fulfilled all these criteria.

Table 1 presents the results of this factor analysis. An item was placed in a factor if it loaded > 0.4 on that factor and if the item was loaded highest on that factor. One item (Item 9: Loss of appetite) did not load >0.4 on any factor and was excluded. Three items loaded >0.4 on two factors (Item 5: Fearful or panicky: Factors 1 & 4; Item 21: Restless/pacing, unable to sit still: Factors 3 & 7; Item 22: Irritable or bad-tempered: Factors 3 & 7); these items were included in the factor where they had the highest factor loading.

Overall, the seven factors accounted for 61.25% of the variance in item scores. The seven factors derived from this factor analysis were provisionally labelled as follows:

Factor 1: Depression 1 (7 items; rotated eigenvalue=4.19; % variance explained=15.50%)

Factor 2: Sleep Problems (3 items; rotated eigenvalue=2.46; % variance explained=9.10%)

Factor 3: Organic Problem (4 items; rotated eigenvalue=2.35; % variance explained=8.70%)

Factor 4: Panic (3 items; rotated eigenvalue=2.11; % variance explained=7.80%)

Factor 5: Psychosis (4 items; rotated eigenvalue=2.09; % variance explained=7.72%)

Factor 6: Hypomania (3 items; rotated eigenvalue=1.72; % variance explained=6.37%)

Factor 7: Depression 2 (2 items; rotated eigenvalue=1.64; % variance explained=6.06%)

The second step of the analytic strategy was to use AMOS 5 to conduct a confirmatory factor analysis with Subsample B (n=601), using the factor structure derived from the exploratory factor analysis conducted with Subsample A. This confirmatory factor analysis used the additional assumption that all factors would be associated with each other. Although multiple indicators of goodness of fit exist (Byrne, 2001), all the indicators presented a consistent view of the goodness of fit of the factor structure derived from Subsample A within Subsample B, indicating a mediocre to poor fit. For example, the root mean square error of approximation (RMSEA) was 0.098 (90% confidence intervals 0.094 – 0.102), where <0.05 indicates a good fit, 0.06-0.08 a reasonable fit, 0.08-0.10 a mediocre fit, and >0.1 a poor fit (MacCullum et al., 1996). Similarly, the comparative fit index (CFI) value was 0.673, where the maximum fit CFI score is 1 and values above 0.95 are considered to represent a good fit (Hu & Bentler, 1999).

Because of this poor fit, additional analyses were then conducted. A second exploratory factor analysis was run for Subsample B to examine similarities and differences in empirically derived factor structures across the two subsamples, using the same procedures as that conducted for Subsample A and

specifying a 7-factor solution. Overall, the seven factors accounted for 56.39% of the variance in item scores. The seven factors derived from this factor analysis were provisionally labelled as follows:

Factor 1: Depression (6 items; rotated eigenvalue=2.90; % variance explained=10.74%)

Factor 2: Anxiety (5 items; rotated eigenvalue=2.43; % variance explained=8.99%)

Factor 3: Sleep Problems (3 items; rotated eigenvalue=2.34; % variance explained=8.66%)

Factor 4: Organic (3 items; rotated eigenvalue=2.07; % variance explained=7.68%)

Factor 5: Non-specific (4 items; rotated eigenvalue=1.93; % variance explained=7.15%)

Factor 6: Psychosis (3 items; rotated eigenvalue=1.91; % variance explained=7.08%)

Factor 7: Hypomania (2 items; rotated eigenvalue=1.64; % variance explained=6.08%)

------- Insert Table 1 about here ------

Table 1 presents information on which items in the Subsample A factor analysis were loaded in the Subsample B factor analysis subscales and the original subscales presented by Moss et al. (1998); both the three-subscale scoring system and the eight subscales derived through factor analysis. As Table 1 shows, relatively few items were consistently placed within similar subscales across the two factor analyses in this study and the analyses of Moss et al. (1998). Four items concerning depression (2, 3, 15, 16), three items concerning sleep problems (17, 18, 19) and two items concerning psychosis (25, 26) were consistently mapped together across analyses. Beyond this, individual items concerning organic problems (23), phobic anxiety (4) and elevated mood (7) mapped consistently across analyses.

Finally, a further confirmatory factor analysis was conducted with the whole sample (Subsamples A and B combined) using six factors derived from these items scoring consistently across analyses; depression (4 items), sleep problems (3 items), psychosis (2 items), organic problems, phobic anxiety and elevated mood (1 item each). Although the goodness of fit indices were improved compared to the

original confirmatory factor analysis (RMSEA=0.089 (90% confidence intervals 0.082-0.096); CFI=0.862), they still indicated a mediocre to poor fit of the data to the model.

Discussion

Before discussing the implications of the findings, it is important to note some limitations of the current study. First, because data were collected from professional and non-professional carers, valid assessments of the severity of ID were not obtainable. Given the problems of reliably and validly assessing mental health problems amongst people with severe ID (Hatton & Taylor, 2005), future research could profitably examine the reliability and validity of the PAS-ADD Checklist across different levels of severity. Second, the only data available on informants were their relationship to the service user and the length of time they had known the service user; a more detailed investigation of the impact of informant characteristics on PAS-ADD ratings would be valuable. Third, although the data collected are from a large sample, they are not necessarily generalisable to the population of adults with ID in the UK or internationally, and caution needs to be exercised in comparative studies using data from this study. Fourth, given the range of informants and the range of settings where people with ID were living, it is possible that empirically derived subscales from the PAS-ADD may be more reliable when used by certain informants (e.g. nursing staff) or in certain settings where informants have more opportunity to observe the person with ID (e.g. hospital settings). The sample size in this study broken down into specific informant groups and living situations was not sufficient to allow us to investigate this possibility, although if the screening tool reflected underlying psychopathology we would expect the factor structure of such a screening tool to be consistent across different circumstances. Fifth, it was not possible to use a concurrent measure of mental health problems or collect data on clinical diagnoses for the whole sample, meaning that the concurrent or discriminant validity of the different ways of scoring the PAS-ADD Checklist and the differential sensitivity of particular subscales could not be evaluated in this study.

This study is the first to report on a factor analysis of the PAS-ADD Checklist utilising a large (1,000+) sample of adults with ID across a range of settings (c.f. Moss et al., 1998; Sturmey et al., 2005). Two exploratory factor analyses of randomly selected subsamples within this study produced clinically coherent factor subscales, as have previous exploratory factor analyses conducted on smaller samples (Moss et al., 1998). However, the two exploratory factor analyses revealed substantial differences, and confirmatory factor analysis revealed that a factor structure derived through exploratory factor analysis showed a mediocre to poor fit to data within the sample. Indeed, there were relatively few items that loaded together consistently across the factor analyses conducted in this study and in previous studies, and a confirmatory factor analysis based on these items also showed a mediocre to poor fit to the data within this sample. On this basis, PAS-ADD subscales derived from factor analyses appear to show little stability, and are unlikely to demonstrate the sensitivity and specificity required for use in clinical practice. On this basis, the results of this investigation confirm those of Simpson (1998) and Sturmey et al. (2005), that the most appropriate use of the PAS-ADD Checklist is as a generic screening tool for a broad spectrum of possible mental health problems. This is an issue that is not unique to the PAS-ADD Checklist; other measures designed to screen for multiple mental health problems amongst people with ID have also been shown to lack specificity in their subscales (e.g. Sturmey & Berman, 1994, for the Reiss Screen; Sturmey et al., 1991, for the PIMRA) or have not reported data on subscale specificity (e.g. the DASH; Matson et al., 1991). Although the evidence is limited, there seems to be more encouraging data on specificity either for more comprehensive mental health assessments for people with ID, involving interviews where possible with the people and an informant (e.g. the full PAS-ADD; Deb et al., 2001), or for longer general population mental health screening tools that have been applied to people with ID, such as the Symptom Checklist 90 (revised) (Derogatis, 1983; see Kellett et al., 1999) or the Brief Symptom Inventory (Derogatis, 1993; see Kellett et al., 2003, 2004).

This study suggests that careful statistical research involving large samples is required to establish

the validity of subscales used in screening measures before they are adopted into routine clinical practice. Stepped systems of assessment, where screening tools are used to assess the general likelihood of psychopathology triggering more comprehensive mental health assessments, are indicated for clinical practice. Research involving the use of these screening tools should also be cognisant of the likely lack of specificity in subscale scores, and consider carefully the use and interpretation of such subscales in mental health research with people with ID.

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Table 1

Factor structure of PAS-ADD Checklist (principal components analysis, varimax rotation, 7 factor-solution): Subsample A (n=543)

Factor	Rotated item factor loading	Exploratory factor analysis Subsample B (n=601)*	Moss et al. (1998) 3-subscale scoring**	Moss et al. (1998) Factor analysis***
Factor 1: Depression 1 (7 items; rotated eigenvalue=4.19; % variance explained=15.50%)				
Item 15: Avoids social contact more than usual	0.76	D	A/N	D1
Item 16: Loss of self-esteem	0.75	D	A/N	D2
Item 2: Loss of interest/enjoyment	0.69	D	A/N	D1
Item 14: Suspicious, untrusting, behaving as if someone is trying to harm them	0.64	A	A/N	PA
Item 1: Loss of energy	0.62	O	A/N	PA
Item 3: Sad or down	0.61	D	A/N	D1
Item 13: Shows loss of confidence	0.55	A	--	--
Factor 2: Sleep Problems (3 items; rotated eigenvalue=2.46; % variance explained=9.10%)				
Item 18: Waking too early & unable to sleep again	0.81	S	A/N	R
Item 19: Broken sleep	0.75	S	A/N & O	R
Item 17: Delay in falling asleep	0.73	S	A/N	R
Factor 3: Organic Problem (4 items; rotated eigenvalue=2.35; % variance explained=8.70%)				
Item 24: More forgetful or confused than usual	0.72	O	O	NS
Item 23: Less able to use self-care skills	0.67	O	O	--
Item 21: Restless/pacing, unable to sit still	0.53	NS	A/N & O	--
Item 20: Less able to concentrate	0.50	D	A/N & O	R & PA
Factor 4: Panic (3 items; rotated eigenvalue=2.11; % variance explained=7.80%)				

Item 12: Startled by sudden sounds/movements	0.81	A	A/N	D1
Item 4: Sudden intense fear/panic triggered by situations/things	0.65	A	A/N	PA
Item 5: Fearful or panicky	0.48	A	A/N	H
Factor 5: Psychosis (4 items; rotated eigenvalue=2.09; % variance explained=7.72%)				
Item 27: Odd gestures/mannerisms	0.69	NS	--	ASD
Item 28: Odd/repetitive use of language	0.66	NS	--	ASD
Item 25: Strange experiences for which other people can see no cause, such as hearing voices	0.65	P	P	P
Item 26: Strange beliefs for which other people can see no reason	0.62	P	P	P
Factor 6: Hypomania (3 items; rotated eigenvalue=1.72; % variance explained=6.37%)				
Item 7: Too happy or high	0.75	H	A/N	H
Item 6: Repeated actions	0.48	--	A/N	P
Item 10: Increased appetite, over-eating	0.48	H	A/N	PA
Factor 7: Depression 2 (2 items; rotated eigenvalue=1.64; % variance explained=6.06%)				
Item 8: Attempt suicide/talks about suicide	0.53	P	A/N	D2
Item 22: Irritable or bad tempered	0.44	D	A/N & O	D1

*D = Factor 1: Depression; A = Factor 2: Anxiety; S = Factor 3: Sleep problems; O = Factor 4: Organic; NS = Factor 5: Non-specific; P = Factor 6: Psychosis; H = Factor 7: Hypomania

**A/N = Affective/neurotic; O = Organic; P = Psychosis

***D1 = Factor 1: Depression 1; R = Factor 2: Restlessness; PA = Factor 3: Phobic anxiety; P = Factor 4: Psychosis; H = Factor 5: Hypomania; ASD Factor 6: Autistic spectrum; D2 = Factor 7: Depression 2; NS = Factor 8: Non-specific